

5

Field of the Invention

10

Description of the Prior Art

15

25

5

10

15
20
25

to the audio codes 34 in the audio encoder 33 in accordance with the format defined by the MPEG-4 standard, to be stored in the memory 15. Upon instruction of a transmitter user, the transmitter 1 will call the distribution server 3 to establish a connection therebetween. Then the text strings (mail envelope and body of text), video codes, and audio codes stored in the memory 15 will be retrieved from the memory 15 to send to the server through a communication interface 17 and the transmission line 2.

Fig. 3 shows a schematic block diagram illustrating the transmission data on the transmission line 2. The data to be sent will consist of information shown in the figure, from left hand side to right hand side. The destination 50 will be sent first, then the text bitstream 51, audio stream 52, and video stream 53. The text (character) stream may be omitted so as not to send if the audio stream may be used instead. In the following description, however, the text stream and audio stream are both assumed to be sent to the destination receiver.

Fig. 4 is a detailed block diagram of the distribution server 3. The operation of the distribution server 3 may consist of two phases. First of two phases is the reception of data (also referred to as mail data herein below) from the transmitter 1, for storing the data 42 input from the transmitter 1 through a communication interface 41 into the storage buffer 45. In this operation, a charge management unit 43 may be served

15

25

display device 66 through the text display processing unit 64. Also the user may retrieve the encoded video 71 and/or encoded audio 75 to decode with a video decoder unit 72 and an audio decoder unit 76 to output the video signal 73 and audio signal 77, and output to the display device 66 and the speaker 78 when required.

Japanese Unexamined Patent Publication No. H11-284973 discloses a technique for transferring and storing data to a host through a communication means when recording a video data. This disclosure may be considered to be as a variation of the foregoing description. The fundamental configuration of a transmitter is identical. Also, the above Japanese Unexamined Patent Publication does disclose nothing about the copy protection and the setting thereof.

The multimedia communication terminals as have been described above of the Prior Art require to implement a camera unit 21 for video input and a video encoder 23 for generating encoded video streams. This configuration is expensive and power-consuming, so that the life of battery for driving the transmitter 1 will be short, or otherwise a battery of larger capacity will be required, resulting in a larger size terminal, with less portability.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above

5 Additional objects and advantages of the invention will
be set forth in part in the description which follows and in
part will be obvious from the description, or may be learned
by practice of the invention. The objects and advantages of
the invention may be realized and attained by means of the
10 instrumentalities and combinations particularly pointed out in
the appended claims.

Fig. 1 shows a constitutional diagram illustrating the
15 conventional multimedia terminals.

Fig. 3 shows a schematic block diagram illustrating the transmission data shown in Fig. 1.

Fig. 5 shows a constitutional diagram of a receiver.

25 Fig. 7 shows a constitutional diagram of a video

Fig. 8 shows an exemplary flow of operation in the video information generating apparatus.

Fig. 10 shows a schematic diagram illustrating some typical examples of encoded audio data and encoded video data.

Fig. 12 shows a schematic diagram of output code of the transmitter shown in Fig. 11.

Fig. 14 shows a flow chart illustrating a typical example of the video information generating apparatus shown in Fig. 11.

Fig. 16 shows an example of data structure in the storage device shown in Fig. 15.

Fig. 18 shows a constitutional diagram of synthesis of background video in the video information generating apparatus.

Fig. 19 shows a constitutional diagram of synthesis of

Fig. 20 shows a constitutional diagram of the modified version of background video in the video information generating apparatus.

Fig. 22 shows a constitutional diagram of the video information generating apparatus shown in Fig. 21.

Fig. 24 shows a constitutional diagram of a representative copy protection code management server.

Fig. 26 shows a mobile terminal having both functions of the transmitter of Fig. 9 and the receiver of Fig. 5.

Fig. 27 shows a modified version of transceiver device shown in Fig. 26.

20 Fig. 28 shows a second modified version of transceiver
device shown in Fig. 26.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[First embodiment]

25 First preferred embodiment of the present invention will

A user who wishes to send video and audio data may connect his/her own transmitter 110 to a video information generating apparatus 100. The video information generating apparatus 100

In the description of the present invention, terminals are referred to as transmitter and receiver according to the primary function for the purpose of simplifying the description. However, the terminals in practice may be one that can be served for both transmission and reception. A transmitter does mean it can send as well as receive data. Similarly, a receiver does mean it can receive as well as send data. A terminal that can handle images and audio-video information may be referred to as video communication terminal, which includes a

transmission-only terminal, a reception-only terminal, and a

terminal served for both sending and receiving functions.

Fig. 7 shows a detailed block diagram of a video information generating apparatus 100 shown in Fig. 6. A camera, video capturing device, captures video. The video data input from the camera and the voice (audio) data input from a microphone will be encoded, in a manner similar to the transmitter 1, to the video codes 24 and the audio codes 34 respectively to be stored in a memory 130. The bitstream codes 24 and 34 may be decoded by a video decoder 141 and audio decoder 145 respectively to video stream 140 and audio stream 144 to be played back on a display device 143 and a speaker 147 in order to confirm the contents. At this point of time, a predetermined fee will be paid from a credit manager 136 to the video information generating apparatus 100. Otherwise, a charge manager 135 may notify the copy protection code manager 137 of the copy protection code 136 of the video codes 24 and audio codes 34. The relationship between the fee and copy limit may be predetermined such that five copies cost 300 yen, ten copies cost 500 yen, and so on. Or one single fee covering any number of copies may be allowed. The copy protection code manager 137 will retrieve the video codes 24 and audio codes 34 from a memory 130 through the link 38 to update the copy protection code in a predetermined copy protection code management field of the streamed data, to write back thus updated audio-video code 139 with the copy protection code into the memory 130. Then, the

audio-video stream with copy protection information 101 will be read out from the memory 130 through a communication interface 132 to the transmitter 110. A controller unit 35, in response to the operation triggering the video and audio recording by the user of the video information generating apparatus 100, may direct the video encoder 23 and audio encoder 33 to start operating and stop in a predetermined period of time (for example, 5 to 20 seconds). The controller unit 35 also directs the video decoder 141 and audio decoder 145 to start playing back of the video and audio in response to the operation by the user. The controller unit 35 may also respond to the operation by the user to invoke the communication interface 132 to transfer the audio-video stream with copy protection information 101 to the transmitter 110.

Now referring to Fig. 8 an exemplary flow of operation in the video information generating apparatus. This exemplary flow is a typical operation including part of modified version as described later, by way of example. First, a user connects his/her mobile terminal, which may be served as a transmitter to the communication interface 132 (step 2001). The communication interface 132 will confirm whether or not the transmission of information to that mobile terminal is allowed (step 2002). Then the number of available copies of the copy protection code and the corresponding charge will be displayed on the terminal under the control of the controller unit 35 along

5

10

15

25

is not good and the user enters his/her decision, the process will go back to step 2009. If the user enters 'OK', the number of protected copies predetermined by the credit deposited by the user and encoded video and audio codes will be generated (step 2013). These codes will be transmitted to the mobile terminal through the communication interface 132 (step 2014).

It should be understood that although not mentioned in the foregoing discussion, a background music may be recorded at the same time to the video recording.

Now referring to Fig. 9, there is shown a detailed block diagram of a transmitter 110. The transmitter 110 may receive and store the audio-video stream with copy protection information into the memory 15 through the video information generating apparatus 100, transmission line 101, a communication interface 150. Text information 14, if any, may be entered from the character input device 11 through the editor unit 13 into the memory 15, prior to or subsequent to the storage process of audio-video stream. When transmitting the text 14 and audio-video stream with copy protection information 101 to a receiving terminal, the copy protection code controller 152 will retrieve the copy protection code management field from within the audio-video stream with copy protection information to determine the number of copies available. If the number is one or more, then the number will be decremented by one and written back to the copy protection code management field.

5

15

25

20

25

appropriate field if the value in the check field is matched with the check value determined from the actual copy protection code, then no modification has been made thereto. Here an inspector function may be implemented in either of transmitter, receiver, or distribution server.

[Second embodiment]

Now referring to Fig. 11, there is shown another preferred embodiment of the present invention. This second preferred embodiment is different from the first preferred embodiment of the present invention in that it does transmit the encoded audio-video stream to a distribution server 163 through a link 102 to store in a storage device 123 attached to the distribution server 163, rather than transmit to the transmitting terminal. The transmitter 161 will instead receive only the ID (identification number) of the encoded audio-video stream from a video information generating apparatus 160. When the transmitter 161 sends the audio-video stream to the receiver 5, as shown in Fig. 12, the destination 50, body of text (mail) bitstream 51 in addition to the encoded audio-video stream ID 165 will be sent to the distribution server 163, which server in turn will retrieve the appropriate encoded audio-visual stream corresponding to the encoded audio-video stream ID 165 from within the storage device 123 to send to the receiver 5 the code attached to the destination 50 and the body of text

bitstream 51.

Now referring to Fig. 13, there is shown a detailed block diagram of a video information generating apparatus 160. The blocks at the left hand side from the memory 130 in the figure, namely the encoding and decoding of video and audio may be identical to the video information generating apparatus 100 shown in Fig. 7. Generated audio and video code will be stored in the memory 130. At this point the copy protection code management field shown in Fig. 10 may or may not be present.

The ID management unit 170 will generate a unique ID 172 for each of encoded audio and video bitstreams stored in the memory. The charge manager 135 determines the number available of copies 136 corresponding to the amount that is already collected by the credit manager 36 or that will be positively collected from the user who has created the audio-video bitstream. The number will be multiplexed by the communication interface 132 with the encoded audio-video stream ID 172 to send to the distribution server as the audio-video code ID 103. Simultaneously or later, the audio-video code 131 will be retrieved from the memory to send to the distribution server as the encoded audio-video bitstream 102. On the other hand, the encoded audio-video stream ID 172 and the remaining number of available copies 136 will be multiplexed in the communication interface 173 to send to the transmitter 161 as the audio-video code ID 101.

Fig. 14 shows a flow chart illustrating a typical example

of operation viewed from the viewpoint of video information generating apparatus in accordance with the present invention. In default, the video information generating apparatus may display a demonstration video on the display device 143 or
5 display a live video as is captured by the camera unit 21 (process step 230). In this state, the charge manager 135 may monitor whether a predetermined fee is paid from a user or not (step 231) while waiting for the predetermined fee paid by the user. At the time when the user has paid the fee, the process proceeds
10 to process step 232 to allow recording of subject by the camera unit 21 so as to create an audio-video stream (step 233). Then the system asks the user whether or not the user really desires to purchase the recorded video (step 234). If the user acknowledges the purchase of recording, the process proceeds
15 to process step 235, otherwise back to process step 232 to repeat recording. In step 235, an audio-video code ID 172 will be generated. A communication link will be established to the distribution server 163 (step 236). As have been described above description the audio-video stream ID 172 and the
20 audio-video code 131 will be sent to the distribution server 163 (step 237 and 238). Thereafter the established communication link with the distribution server 163 will be disconnected. Then, the system attempts to establish a connection with the transmitter 161 to transmit signal 101
25 including the encoded audio-video stream ID 172 merged with the

000T80"6295E960

copy protection code.

Fig. 15 shows a detailed block diagram of the distribution server 163. The operation of the distribution server 163 consists of two phases. First is the communication with the video information generating apparatus 160, second the communication with the transmitter 161. The first phase with respect to a given encoded audio-video stream will be performed always prior to the second, and the second may be iteratively repeated for a plurality of times.

In the first phase the audio-video code ID 103 and the audio-video code 102 will be received from the video information generating apparatus 160 through a communication interface 200. The audio-video stream ID 103 having received will be transferred to an audio-video stream ID manager 205, which manager in turn will extract an ID and the number available of copy protection from the received audio-video stream ID to store in a predetermined space in a storage device 206. In parallel the location information of the audio-video stream to be stored in the storage device 123 corresponding to the appropriate ID in the storage device 206 will be generated to store in the storage device 206. The information on storing location of the audio-video stream will be passed to the storage device 123 as the storage location information 121 while at the same time the input audio-video stream 102 will be output to the link 122 through the link 201 and the selector 202. In the storage device

000T80" 6295E960

Prior to explaining second phase, an exemplary data structure of the management table for audio-video stream ID stored in the storage device 206 is shown in Fig. 16. The storage device 206 has a table structure inside in it as shown in Fig. 16, each video and audio encoded stream ID 600 has its copy protection code 601 and video and audio stream storage location 602 recorded in the table. By storing the expiration data 603 of ID along therewith, unlimited increase of the amount of data in the storage device 206 will be prevented. For example, for a stream ID numbered 0, as shown in the row 605 in the figure, the available protected copy limit is 5, data is stored in the location 1000, expiration 00/06/20. When the copy protection code reaches to zero as the code IF 3 of the row 608, the audio-video stream will be prohibited to transmit. This means that under the control of the audio-video stream ID manager 205 the copy protection code in the management table in the storage device 206 for each ID is maintained such that the copy protection code will be decremented by one for one transfer and the transmission of the stream having a copy protection code reached to zero will be prohibited by controlling a gate 215.

163. In the second phase of operation of the distribution

5

10

15

20

25

5 performed prior to the second and third phases, and the second prior to the third, while the third may be iteratively repeated for a plurality of times.

Fig. 13. In Fig. 18, the video 22 recorded by means of the camera unit 21 and a background video 222 selected by the user from a group consisted of a series of background videos 221 previously archived are combined at the video synthesizer 223 to create a newly synthesized video 224, then the newly synthesized video 224 will be encoded to generate the video codes 24. The synthesizing procedure may use the chromakey technique, in which a blue wall panel provided for the background of the object to be video recorded with the camera unit 21, and the specific color component (in this case, blue) may be replaced with the background 222 instead of the video signals 22 recorded by the camera, in the synthesizer.

25 microphone 31 may be synthesized in the audio synthesizer 233

with a background sound 232 selected from a group consisted of a series of background sounds 231 to generate the audio 234 to be encoded to the audio codes 34.

Fig. 20 shows a second example of the modified version of video encoder block 200 of the video information generating apparatus 160 shown in Fig. 13. In Fig. 20, the video 22 recorded by means of the camera unit 21 will be processed by the video encoder 240 to strip out the background, so as to enable object encoding of the object. The typical object encoding methods may include, among others, the shape coding defined by MPEG-4. Then the encoded object may be multiplexed by the multiplexer 243 with a background code 242 selected from a group consisted of a series of background codes pre-recorded and pre-encoded from background videos to generate the video codes 24 of two objects consisted of background video and the object video. In order to decode the encoded video, the video decoder unit 72 of the receiver 5 shown in Fig. 5 has to incorporate the decoding function of object encoding.

Fig. 21 shows a representative example of synthesis of a background video and an object video performed in a distribution server 310. The primary difference from the system shown in Fig. 11 is in that the background video selector signal 304 is added, a background storage device 312 is attached to the distribution server 310, the object video (the video code of the audio-video encoded stream 102) and a background video

000780" 6295960

code 313 are synthesized (multiplexed) in the distribution server 310.

Fig. 22 shows a detailed block diagram of the video information generating apparatus 300 shown in Fig. 21. The primary difference from the video information generating apparatus 160 shown in Fig. 13 is in that a background video is selected by a background video selector 301 (background video 302), and that the selection signal will be transmitted to the distribution server to be served for the background video selector signal 304.

Fig. 23 shows a detailed background of the distribution server 310 shown in Fig. 21. The difference from the distribution server 120 shown in Fig. 15 is in that the receiving function of the background video selector signal 304 is added, that the background video selector signal 321 is used for generating the location information 311 of the appropriate background video in the background read controller 322 to send to the background storage device 312 to retrieve the corresponding background video code 313 stored in the background storage device 312, and that thus read background video code is multiplexed (synthesized) with the video stream 123 of the object (stored in the storage device 123) in the multiplexer 323.

Fig. 24 is a representative copy protection code management server 400 for updating and maintaining the copy

09635629-081000

protection code of the second preferred embodiment. In the figure two procedures are shown for updating the copy protection code. First method is to transfer the audio and video stream ID and additional copy protection code from the transmitter 161 through the transmission line 2 to the copy protection code management server 400 to collect the appropriate fee by the charge processor 210 in the copy protection code management server 400. Second method is to add a functionality supporting the copy protection code update in the copy protection code update terminal (for example, in the video code generating apparatus) to collect the appropriate fee by the apparatus and to send the audio-video code ID and additional copy protection code update available through the transmission line 103 to the copy protection code management server 400. In either method, the audio-video code ID and additional copy protection code update will be input into the ID manager 403, which will update the copy protection code of the appropriate audio and video stream ID in the storage device 206 storing the table shown in Fig. 15 by the specified code.

Fig. 25 shows a detailed block diagram of a copy protection code updater terminal 450 used in the second example shown in Fig. 24. The copy protection code updater terminal 450 may establish a connection to the transmitter 161 through the transmission line 101 to obtain an audio and video stream ID 452. At the same time a charge processor 454 will collect the

5

The following description of modified versions is also in the scope of the present invention.

15

25

5 The fee for the audio and video recording has been described which may be updated in correspondence with the copy protection code. However, the fee may be defined based on the duration of recording, the screen size of input video, the amount of encoded data, or a combination thereof.

In either embodiments described above of the present invention, the link between the video code generating apparatus and the transmitter or the distribution server, the link between the transmitter and the distribution server, the link between the distribution server and the receiver may be based on the hardwired connection or wireless. Also either a line exchange as well as the packet exchange may be equivalently used.

25 Furthermore, the link between the distribution server and the

audio-video synthesizer server in the first and third
embodiments as have been described above may be acceptable
either a hardwired or wireless communication. Also either a
line exchange or packet exchange may be implemented. The
5 distribution server may be implemented in the same apparatus
to the audio and video synthesizer server. A wired link between
the video information generating apparatus and the transmitters
and between the video input terminal and the distribution server
allows the transmission of audio and video encoded stream having
10 relatively much data in a reliable, high-speed and cost-
effective manner, in comparison with the wireless communication.
Because the embodiments shown in Fig. 11 and Fig. 21 do not
transmit the audio and video encoded stream between the video
information generating apparatus and the transmitter, a
15 hardwired link is not necessarily required, however the wired
communication, which allows the positive transmission of
product (encoded data), may assure users. The communication
link of data between the video information generating apparatus
and the transmitter is not necessarily on a communication line.
20 For example, a removable storage device, more specifically any
data carriers may be used including nonvolatile memories such
as a flash memory and a flash memory-card, floppy diskettes,
MD (mini disk), CDR (CD recordable), DVD (digital versatile
disk) RAM and the like.

25 Although the audio and video encoded stream and mail data

00635629.031000

have been described in the preferred embodiment above, which may be stored in the same memory of a transmitter or receiver, the audio and video encoded stream may be stored in an external storage device of the terminal (such as a removable flash memory, a hard disk drive, or a floppy diskette and the like) since the bitstreams has much larger amount of data than the mail data.

The function of transmitter and that of receiver have been described separately, however as shown in Fig. 26, a mobile terminal having both functions may be used. In this case, the memory 15 may be shared for by both functions. Moreover, the editor unit 13, video decoder unit 72, and the audio decoder unit 76 shown in Fig. 26 may be implemented by software. Fig. 27 shows a transceiver terminal 1010 having the editor unit 13, video decoder unit 72, audio decoder unit 76 implemented by software. The software will be executed by a CPU 1011, the display video or display characters will be output through a display memory 1013, speech or audio output through an audio output 1014. The memory included in a display memory and controller 1013 may be sharable with the main memory 1012. In Fig. 27, the communication interface 17 is shown as one block that includes the functionality of communication interface 17 and communication interface 60. One practical example of the transceiver terminal 1010 shown in Fig. 27 may include, among others, a portable cellular phone.

Another modified version of device shown in Fig. 26 is

000180 6295E960

illustrated in Fig. 28 as a transceiver terminal 1020. The transceiver terminal 1020 has a character input device 11 (for example, a keyboard and a mouse), a display device 66 (for example a monitor display), a speaker 78 attached outside the terminal. In addition, an external storage device 1022 and an external storage interface 1021 controlling the storage device are installed as well. The external storage device 1022 may include a hard disk drive or a flash memory, which may store softwares served for editor unit 13, video decoder unit 72, and audio decoder unit 76, as well as softwares served for communication management, copy protection code management and the like. The external storage device 1022 may be the same device as the removable storage device as have been described above, or may be proprietary. Furthermore, another external storage interface may be installed to the transceiver terminal 1020 to connect both the removable media device and a fixed device (a hard disk drive and the like, which is never hot-swapped). A practical example of the transceiver terminal 1020 of Fig. 28 may include a personal computer, a handheld computer, a personal organizer, a portable information terminal, and the like.

In any preferred embodiments of the present invention, a common transmission procedure may be used in the communication interface using the transmission line 101 (for example, communication interface 150) and the communication interface

000180" 62953960

using either or both the transmission line 2 and transmission line 4 (for example, the communication interface 17).

The distribution server shown in Fig. 15 may be split into two parts consisted of the data communication processor 550 and the audio and video coded stream manager 551. These parts may be located in geologically different locations. Here the data communication processor unit 550 and the audio and video encoded stream manager 551 may be implemented separately. More specifically, the location information (for example, URL) of the code processor unit in addition to the stream ID may be stored in the audio and video encoded stream ID to forward by the communication processor unit to the receiver the audio and video encoded stream ID as part of a mail. The receiver in turn decodes the contents of audio and video encoded stream ID to obtain the appropriate encoded stream by accessing the code processor once again.

Also, the storage device 123, the background storage device 312 may be located in a geologically separate location. The data communication therebetween may be implemented by either a hardwired or wireless connection, and by either a line exchange or a packet exchange.

The audio and video encoded stream ID may be encrypted when passing through the link between the video information generating apparatus and the distribution server or transmitter, or between the transmitter and the distribution server in order

to prevent an unauthorized attempt of use of the audio and video stream ID by a third party. If the connection between the video information generating apparatus and the transmitter is implemented as a hardwired communication of face-to-face, data encryption may not be necessarily required. When sending the audio and video stream ID from the transmitter to a distribution server, some codes for unique identification of the transmitter side along with the audio and video encoded stream ID may be added, or the audio and video encoded stream ID may be encrypted by a private key that only the transmitter possesses in order to prevent any unauthorized attacks.

Any preferred embodiments of the present invention may be implemented by hardware, by software, or by a combination thereof. In case of a software-implemented system, the program that manages the copy protection code in the transmitter is assumed to be installed in the terminal by default. The software may also be installed by downloading from either a video input terminal 100, or distribution server 120, or any other connectable server. The receiver in any preferred embodiments of the present invention has been described, which may not copy the received audio and video encoded stream to elsewhere, namely may not forward to any other terminals. However, in order to implement this restriction, either one of following two control functions are required.

First control function may be the implementation of

restricting the transmission of received audio and video encoded stream to a third party. To achieve the first control function a specific process including flagging a special bit or storing in a specific storage area when storing the received audio and video encoded stream should be implemented to identify from any other transmittable files or data.

Second control function may be the implementation of the copy protection code management in the receiver in a manner similar to the transmitter. In Fig. 10, the copy protection code is 0 upon reception of audio and video encoded stream, as shown by the reference numeral 503. When a copy protection code management is implemented in the receiver as well, no special process is needed for the received code to be copy-protected. In addition, when the second control function is implemented, an additional functionality may be achieved in which a sender may specify the number of copies allowed. This means that, by writing a value 1 or more in the copy protection code management field (for example, 2) when transmitting, the receiver may forward the received audio and video encoded stream to someone else by the number of times (for example 2) that the transmitter has specified. In such a case the number available of copies after transmission from the sender will be decremented by the value written in the copy protection code management field plus one (in the foregoing example, subtracting 3 from the value before transmission).

000180" 6295960

5

15

20

25

5

10

20

Otherwise, the user plays a game in advance, and the camera may be operable in accordance with the result of the game. In this case the copy protection code added to the video code may be varied in correspondence with the points obtained in the game by the user.

10

25

function separated from the transmitter allows the processing load of the transmitter to be significantly decreased, resulting in a smaller size terminal with a longer battery life. More sophisticated services such as background synthesis may be

5 readily provided.

It is to be understood that the present invention is not to be limited to the details herein given but may be modified within the scope of the appended claims.

000180" 6295E960